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METHODS OF TEST FOR METAL CONTAINERS

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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January 1964

Indian Standard
METHODS OF TEST FOR METAL CONTAINERS

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Indian Standard
METHODS OF TEST FOR METAL CONTAINERS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 19 August 1963, after the draft finalized by the Metal Containers Sectional Committee had been approved by the Chemical Division Council.

0.2 A number of Indian Standards on metal containers have already been formulated. The necessity for laying down the procedures for evaluating the requirements of the metal containers has been keenly felt by the testing and inspecting authorities and the industry alike. The formulation of this standard has, therefore, been taken up to meet this need.

0.3 This standard gives the details of apparatus and procedure for four commonly used tests based on the current trade practice prevalent in the country. The particular tests required to be performed as well as the requirements of the particular containers are specified in the individual standard specifications on metal containers. It may also be appreciated that a certain amount of variation in the design of the apparatus is possible from place to place while performing the tests prescribed in this standard. This standand, therefore, gives only the essential details and a typical set up of the apparatus and the corresponding procedure, which should be used as a guidance for any particular set up. Based on the experience gained in the use of these and similar other apparatus, additional details may be given later on as required.

0.4 Wherever a reference to any Indian Standard appears in this standard, it shall be taken as a reference to the latest version of the standard.

0.5 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*).

1. SCOPE

1.1 This standard prescribes the methods of test for metal containers. The tests prescribed are:

a) Air Pressure Test,

b) Hydraulic Pressure Test,
c) Handle Pull Test, and
d) Drop Test.

1.2 This standard does not deal with the requirements of metal containers, which are covered by separate standards, but specifies only the essential details of the methods for testing them.

1.3 Should any inconsistency exist between the requirements of this standard and those, if any, given in the standard for individual containers, the latter shall prevail.

2. TERMINOLOGY

2.1 For the purpose of this standard, definitions given in *IS: 1394-1959 Glossary of Terms Relating to Metal Containers Trade shall apply.

3. AIR PRESSURE TEST

3.1 General — The air pressure test is a general test applicable to all types of air-tight metal containers. While it serves to detect a leak in the container, it is not severe enough to test its mechanical strength.

3.2 Equipment

3.2.1 *Air Supply Equipment* — The equipment used varies according to the type of containers tested. These may be divided, for the purpose of this test, into the following two types:

a) *Type A* — Containers which have a small closure orifice situated on the top. Examples of this type are the 18-litre square tins, the rectangular tins, and the drums.
b) *Type B* — Containers which are double ended or in which the closure orifice extends over the whole or a large part of the top. Examples of this type are the round paint tins and the round *vanaspati* tins.

3.2.1.1 For containers of Type A, a pressure line from an air compressor is used. A rubber plug, tapered so as to fit tightly into the closure orifice of the container, is fixed to the end of the air line. The testing pressure may be regulated by an air pressure valve and read on a pressure gauge connected to the system.

3.2.1.2 Containers of Type B are tested by a more elaborate equipment as described below:

a) Double ended containers are tested by means of a hand can testing equipment shown in Fig. 1. This is a destructive test.

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*Since revised.

b) Containers having a large closure orifice are tested by an equipment which, in its simplest form, consists of a rubber pad and a metallic baseplate with an arrangement to clamp the tin between them. A compressed air line is connected to the rubber pad, and the air pressure is read on a pressure gauge connected to the system. A typical equipment is shown in Fig. 2.

3.2.2 *Reservoir* — holding enough water such that the container can be fully or partly immersed in it as required.

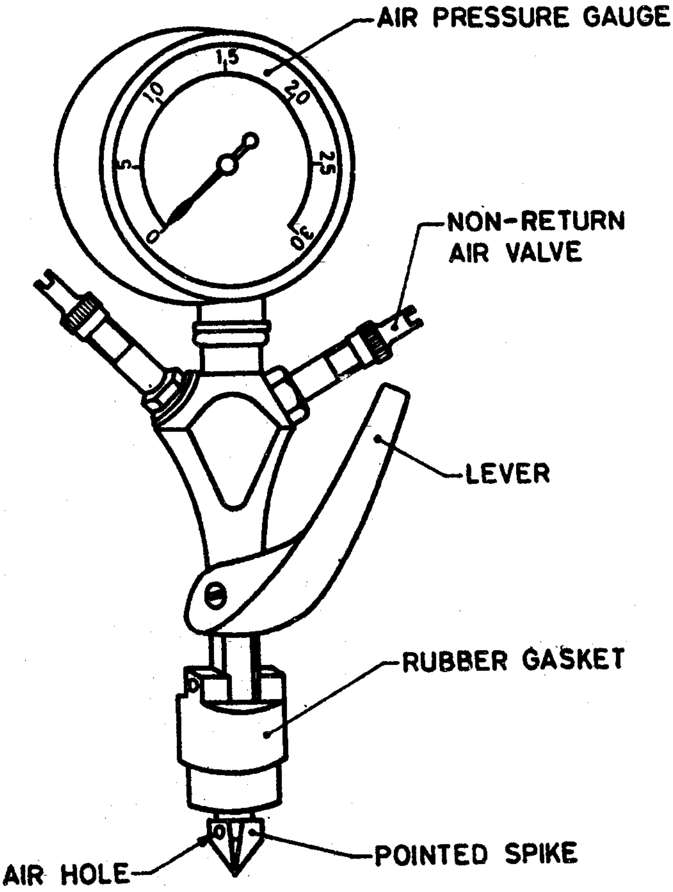


Fig. 1 Hand Can Testing Equipment

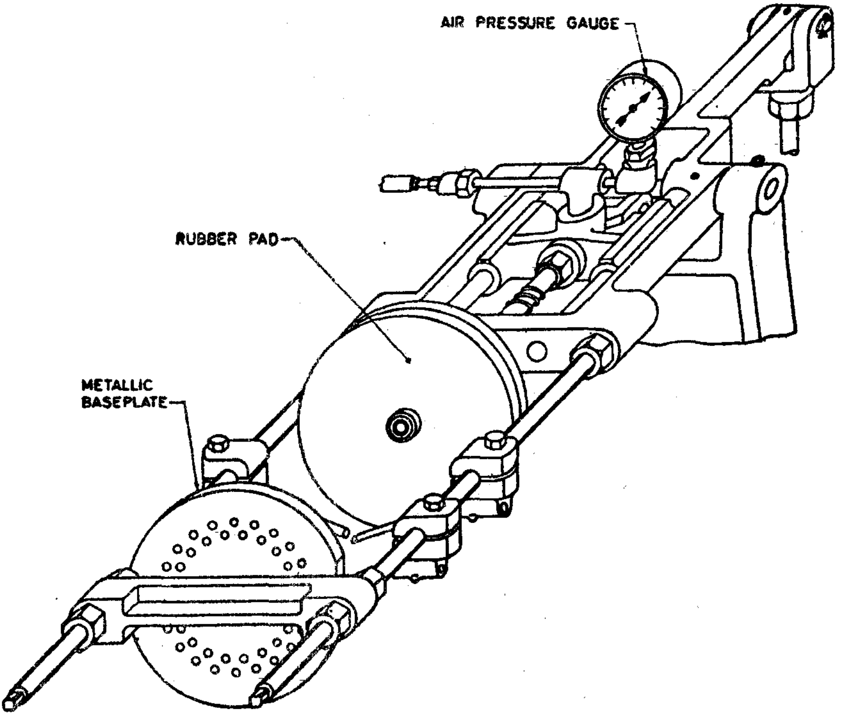


FIG. 2 AIR PRESSURE TESTING EQUIPMENT

3.2.2.1 In the case of large drums, the reservoir may not be necessary, and could be functionally substituted by the use of soap solution.

3.3 Procedure

3.3.1 A container of Type A is connected to the air line by tightly fitting the rubber plug in the closure orifice. The container is then immersed in the water reservoir. Any leakage is easily detected by the bubbles of air escaping through the water.

3.3.1.1 For large drums the air leakage in the test may be detected by applying soap solution to the seams and observing the formation of bubbles at the points of leakage, the drums being supported horizontally on rollers.

3.3.1.2 For testing screwed closures, the closures shall be assembled on the drums, the air line connected to the drum and the test conducted as in 3.3.1.

3.3.2 When testing double ended containers of Type B by the hand can tester, the pointed spike is first pushed into the can end and rotated slightly, after which the lever on the side of the tester body is depressed to compress the rubber gasket to form an air-tight seal. Air is then forced into the can through the air valve by means of the hand pump, to the required pressure, after which the can is immersed in water to indicate the position of any leaks.

3.3.3 Containers of large closure orifice without their loose closure components, are clamped between the rubber pad and the baseplate of the testing equipment with the top of the container under the rubber pad. Air under pressure is admitted into the container through the rubber pad. The set up is now immersed in water and any leakage of air observed.

3.3.4 It should be noted that the container shall be immersed in water only after the air pressure has been applied. Otherwise, very fine capillary leaks will not be detected as water will tend to get drawn into these capillaries and will not be dislodged by subsequent air pressure.

4. HYDRAULIC PRESSURE TEST

4.1 General — The hydraulic pressure test is more severe than the air pressure test and is used to examine the mechanical strength of the container. It is a destructive test.

4.2 Equipment — A typical equipment, illustrated in Fig. 3, consists of a water tank from which water is pumped under pressure into the container to be tested. A wire or wooden cage to be placed over the container during the test is required as a safety measure.

4.3 Procedure — The end of the hose pipe is connected with the container under test through the closure orifice. The container is first completely filled with water. The rectangular mild steel piece is placed inside the opening and the clamp on top of the mild steel washer tightened such that the rubber washer below compresses against the side of the opening to form a tight seal. The reservoir is filled with water, the valve on top of the pump is closed and the hand hydraulic pump is worked to force water gradually into the container. The hydraulic pressure thus developed is read on the pressure gauge. The pressure is increased until the prescribed limit is reached. Any fall in the pressure or leakage developing during the prescribed time is observed.

5. HANDLE PULL TEST

5.1 General — The handle pull test is applied to containers to ensure that the handle, which is usually fixed to the top of the container,

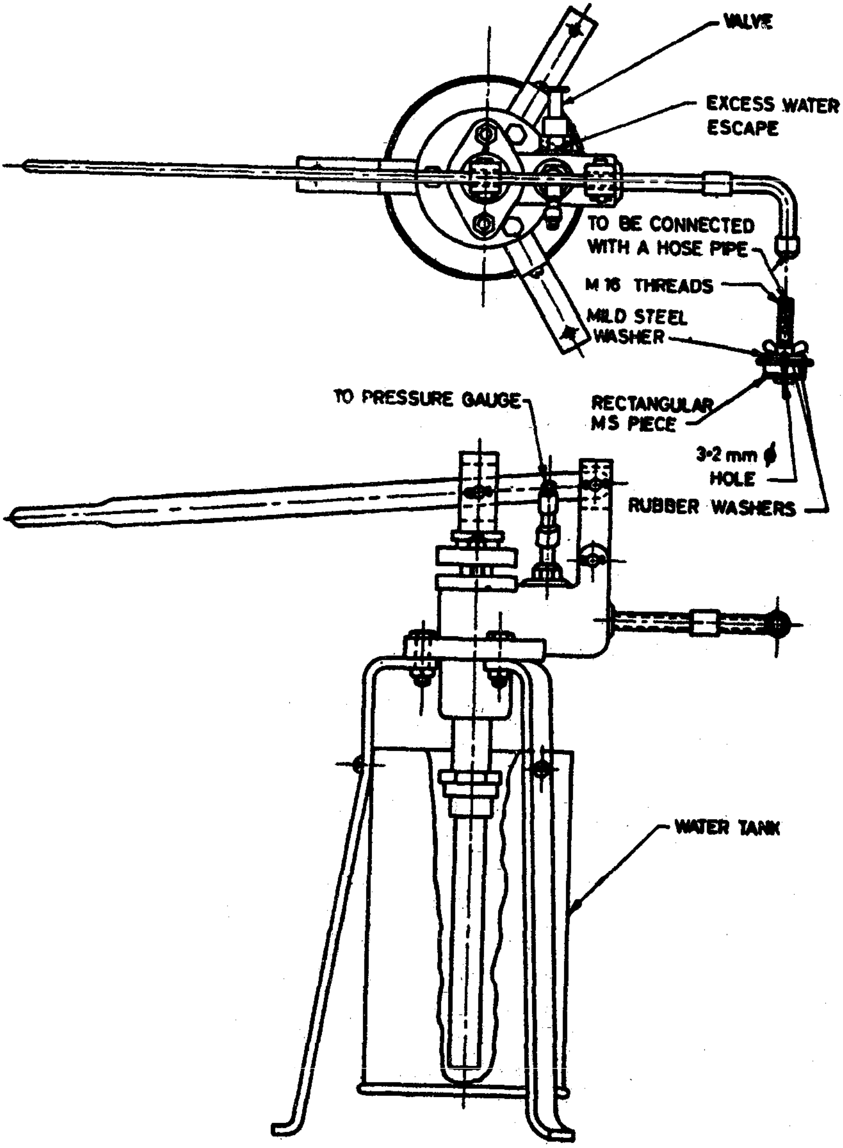


FIG. 3 HYDRAULIC PRESSURE TESTING EQUIPMENT

will not come apart or be displaced while the filled container is being carried.

5.2 Equipment — Any apparatus which applies a gradual vertical pull to the handle would suffice. A typical set-up consists of a frame made of strips and angles of mild steel such that the container under test may be accommodated within this frame. A spring balance is suspended vertically over the container by connecting its top hook by means of a horizontal rod to the ram of a hydraulic jack which rests on top of the frame (*see* Fig. 4).

5.3 Procedure — The hook of the spring balance is connected to the handle of the container by a bracket (*see* Fig. 4). By working the hydraulic jack, a gradual vertical pressure as calibrated on the spring balance is applied to the handle for the prescribed period of time. Any displacement of the handle during this period will constitute a failure of the container to adhere to the requirement of this test.

6. DROP TEST

6.1 General — The drop test is used to measure the ability of the container to withstand rough handling while in a packed condition.

6.2 Equipment — The equipment shall consist of the following.

6.2.1 *Drop Test Equipment* — Any suitable equipment may be used that conforms to the following requirements:

a) Permits accurate prepositioning of the container to assure an unobstructed fall from rest, and permits impact at the specified places and in the desired direction.

b) Permits accurate and convenient control of the height of drop.

c) Where the weight of the container is high, utilizes efficient lifting devices.

d) Provides a solid surface of concrete or other equivalent material of sufficient mass to absorb all shock without deflection.

6.2.1.1 A typical equipment consists of a quick release device (*see* Fig. 5) which could be raised to the required level by means of a pulley-block mounted on a frame work on a level concrete platform and attached to the quick release device at point *A* (*see* Fig. 5A). By pulling the rope attached to the eye at the end of the horizontal lever *B*, the limb *C* is released quickly so that the container suspended by means of ropes loosely on to it slips and falls from the position of rest. The container is suspended from the limb *C* by means of ropes or a clamp (*see* Fig. 5B) in such a way that the point meant to strike the concrete platform hangs bottom most.

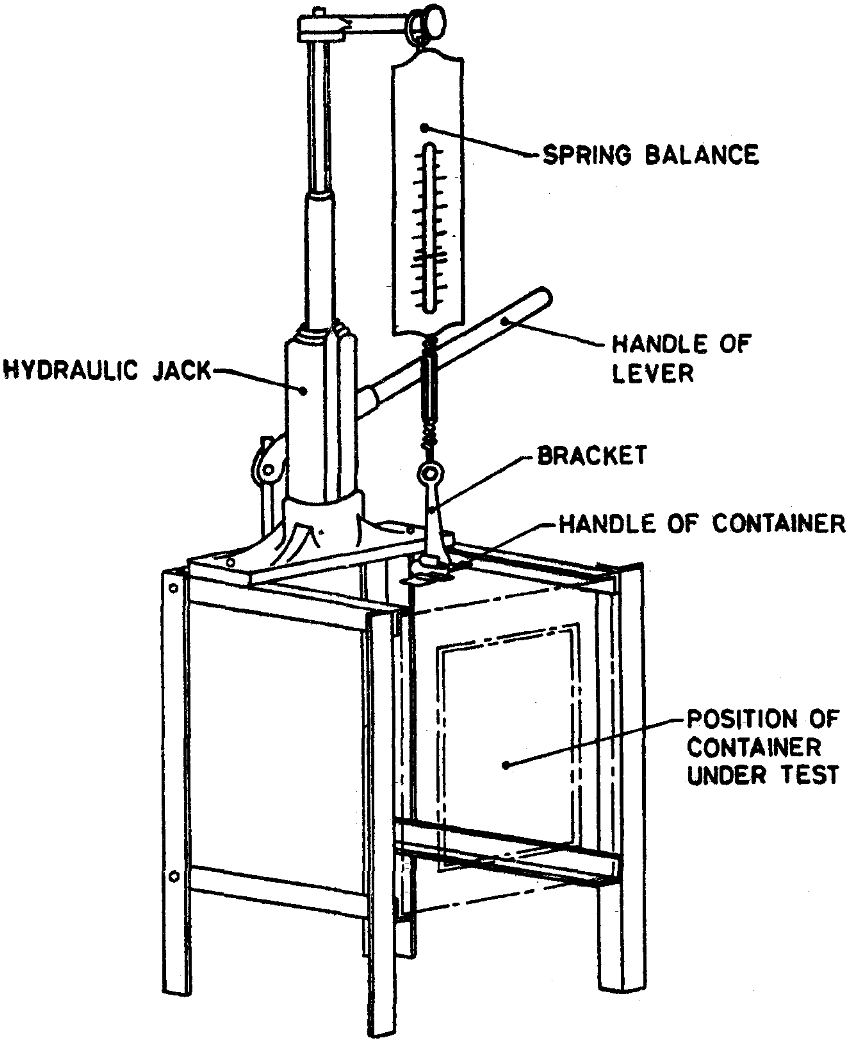
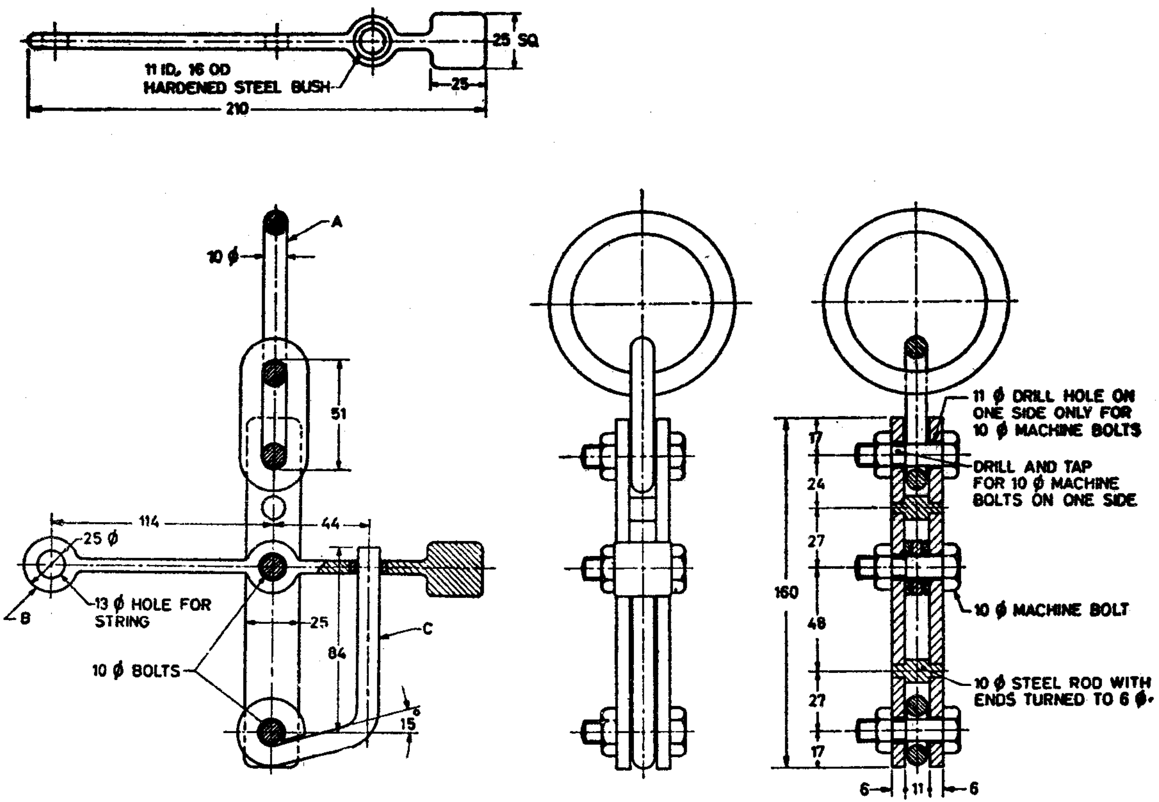


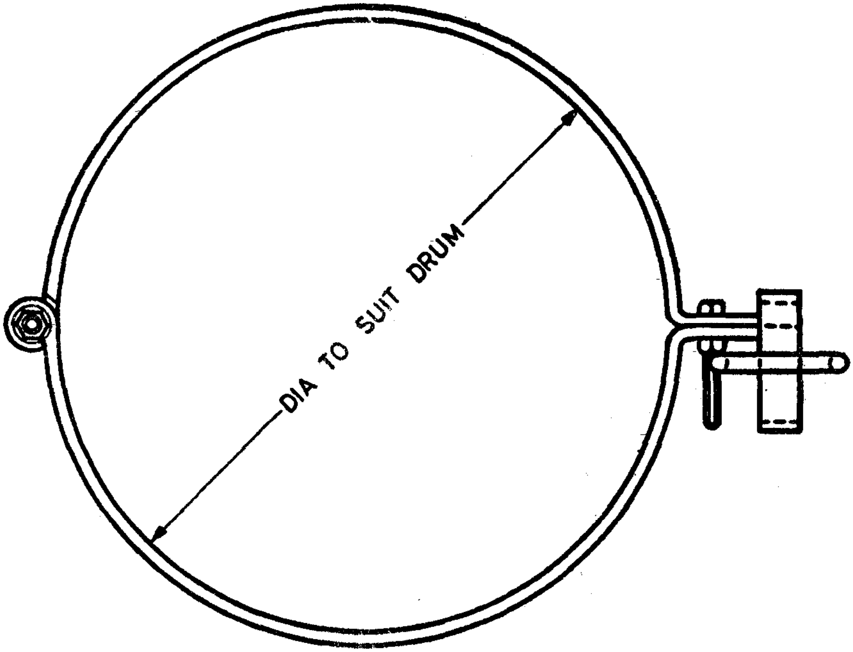
FIG. 4 HANDLE PULL TESTING EQUIPMENT


11 ID, 16 OD
HARDENED STEEL BUSH
25 SQ
25
210
A
10 ϕ
51
114
44
25 ϕ
B
13 ϕ HOLE FOR STRING
25
84
C
10 ϕ BOLTS
6
15
11 ϕ DRILL HOLE ON ONE SIDE ONLY FOR 10 ϕ MACHINE BOLTS
DRILL AND TAP FOR 10 ϕ MACHINE BOLTS ON ONE SIDE
10 ϕ MACHINE BOLT
10 ϕ STEEL ROD WITH ENDS TURNED TO 6 ϕ.
17
24
27
160
48
27
17
6
11
6

5A Quick Release Device

All dimensions in millimetres.

FIG. 5 TYPICAL QUICK RELEASE DEVICE AND CLAMP — *Contd*



5B Clamp

FIG. 5 TYPICAL QUICK RELEASE DEVICE AND CLAMP

6.2.2 *Air Pressure Testing Apparatus* — as prescribed in **3.2.**

6.3 Procedure — The container shall be filled with water up to 98 percent of its capacity. After properly securing all closures, it shall be elevated to the required height, keeping its diagonal in a vertical position. It shall then be dropped from this height in such a manner as to fall freely and to strike the concrete floor at points prescribed in individual specifications for containers.

6.3.1 After each drop, the closure shall be released and any leakage of water from the container observed.

6.3.2 At the conclusion of the required number of drops, the container shall be emptied of all water and subjected to the prescribed air pressure test according to the procedure given in **3.3.**

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